Operating instructions
Rescue equipment

LUKAS

CE

P660SG SUPER SILENT

175325085 GB
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STREAMLINE TECHNOLOGY

(Translation of the original Operating Instructions)

Contents Page

1. Danger classes

We distinguish between various categories of safety instructions. The table shown below shows you the overview via the assignment of symbols (pictograms) and signal words the concrete danger and the possible consequences.

Pictogram	Damage / injury to	Key word	Definition	Consequences
	human	DANGER!	Immediate danger	Death or major injury
		WARNING!	Potentially dangerous situation	Potential death or major injury
		CAUTION!	Less dangerous situation	Minor or slight injury
	device	CAUTION!	Danger of damage to device / environment	Damage to the equipment, damage to the environment, damage to surrounding materials
	-	NOTE	Advice for application and other important / useful information and advice	No injury / damage to persons / environment / equipment

 Wear helmet with face guard

 Wear protective gloves

 Wear safety shoes

 Proper recycling

 Protect the environment

 Read and follow operating instructions

2. Product safety

LUKAS products are developed and produced in order to ensure the best performance and quality with proper use.
The safety of the operator is the most important consideration of the product design. In addition, the operating instructions are to help use the LUKAS products safely.
In addition to the operating instructions, all generally applicable, statutory and other binding rules for accident prevention and for environmental protection must be heeded and disseminated.
The device must only be operated by educated persons who are trained in safety technology, because otherwise there is a risk of injury.
We advise all users before using the device to carefully read through the operating instructions and to follow the instructions contained therein without exception.
We also recommend that you get instructed by a qualified trainer in the use of the product.

WARNING / CAUTION!
The operating instructions for the hoses, the accessories and the connected devices must also be heeded!

Even if you have already received instruction, you should read the following safety instructions again.

WARNING / CAUTION!
Make sure that the accessories used and the connected devices are suitable for the max. operating pressure!

	Make sure that no body parts or clothing get between the openly visible moving parts of the device.	Immediately report changes that occur (including changes in operating behavior) to the appropriate persons/ departments! If necessary, immediately shut down and secure the device!	
	Wear protective clothing, protective helm with visor, safety shoes and protective gloves.	Check the device for visible defects or damage before and after use.	
	Working under loads is prohibited if they are raised exclusively with hydraulic devices. If this work is unavoidable, sufficient mechanical supports are additionally required.	Check all lines, hoses and screwed connections for leaks and externally visible damages and repair immediately! Escaping hydraulic fluid can lead to injuries and fires.	
	In the event of malfunctions, shut down the device immediately and secure it. You should have the malfunction repaired immediately.	Do not make any changes (add-ons or conversions) on the device without the approval of LUKAS.	

	Heed all safety instructions and hazard warnings on the device and in the operating instructions.	All safety instructions and hazard warnings on the device are to be kept intact and in a legible condition.	
	Make sure that all safety covers are present on the device and in proper working condition.	Any work procedure that detracts from the safety and/or stability of the device should be abandoned!	
	Safety equipment must never be disabled!	The maximum permissible operating pressure must not be changed.	
	Before switching on/engaging the device or while operating the device, it must be ensured that no one is endangered by operating the device.	Observe all intervals that are prescribed or specified in the operating instructions for recurring tests and/or inspections.	
	When working in the vicinity of live components and lines, take appropriate measures for preventing current transfers or high voltage flashovers to the device.	For repairs only original LUKAS accessories and replacement parts are to be used.	
		Make sure that you do not get caught in the hose loops and trip when working with or transporting the device.	
	The source of electrostatic discharge with the possible consequence of spark formation when handling the device should be prevented.	Do not come in contact with the motor and exhaust system because of the risk of burns.	
	Motor pumps must not be operated in areas at risk for explosion!	Combustion engines must not be operated in closed rooms due to risk of poisoning and/or suffocation.	
	If fuel is spilled on combustion engines, it must be completely removed before starting the motor.	Refuelling during operation of a combustion engine is strictly prohibited!	
	Keep combustion engines and their fuel away from ignition sources due to danger of explosion.	All damaged electrical components (e.g. smouldered cables etc.) must be promptly replaced!	

	In order to prevent fire hazard, ensure sufficient ventilation when operating combustion engines and maintain a safety distance of at least 1 m *(39.4 in.)* to walls and other shields.	Damage to electrical components may only be eliminated by a trained qualified electrician, in compliance with all applicable national and international safety guidelines and regulations.	
	Ensure that the combustion engine motor pumps always sit on a largely level horizontal surface, so that no fuel can leak.	When the units are installed, care needs to be taken that they are not impaired by extremely strong temperature effects.	
	The device is filled with hydraulic fluid. These hydraulic fluids can be detrimental to health if they are swallowed or the vapors thereof are inhaled. Direct contact with the skin should be avoided for the same reasons. Also, when handling hydraulic fluids, note that they can negatively affect biological systems.	When operating and/or storing the device, make sure that the function and the safety of the device are not impaired by strong external temperature effects or that the device is damaged. Consider that the device can also heat up when it is continuously used.	
	Make sure there is adequate lighting while working.	Before transporting the device, always check to see that the accessories are positioned securely against the possibility of an accident.	
	Always keep these operating instructions easily accessible at the site where the device is used.	Make sure you properly dispose of all removed parts, leftover hydraulic fluid, leftover oil and packing materials.	

In addition to the safety instructions of these operating instructions, all generally applicable, statutory and otherwise binding national and international rules for accident prevention need to be heeded and disseminated!

WARNING / CAUTION / ATTENTION!

The device is specified **exclusively** for the **purpose represented in the operating instructions (see Chapter "Proper use")**. Any use that differs or goes beyond this is considered **improper**. The manufacturer/supplier shall not be held liable for damages resulting from improper use. The risk shall be borne solely by the user.
Proper use also includes heeding the operating instructions and complying with the inspection and maintenance requirements.

 **Never work in a fatigued or intoxicated state!** 

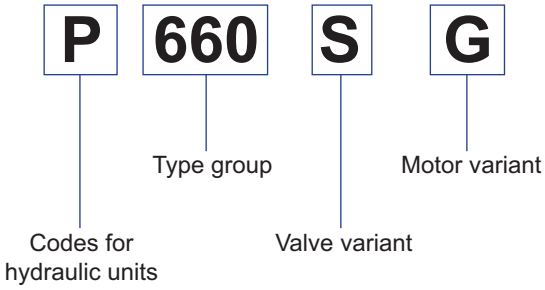
3. Proper use

LUKAS hydraulic units are specifically designed to supply LUKAS rescue equipment with hydraulic fluid so that they can be used to rescue victims in the event of accidents in road, rail and air travel as well as in building rescues.
The use for the supply of pressure or fluid to rescue equipment of other manufacturers is possible, but requires the technical testing and approval of LUKAS on a case-by-case basis.

WARNING / CAUTION / ATTENTION!
Make sure you **always** heed the safety tips contained in these operating instructions with regard to the installation location and type! The units also may not be operated in all atmospheres due to a possible danger of explosion!

Accessories and spare parts for the rescue equipment can be obtained from your authorized LUKAS dealer!

4. Unit labelling



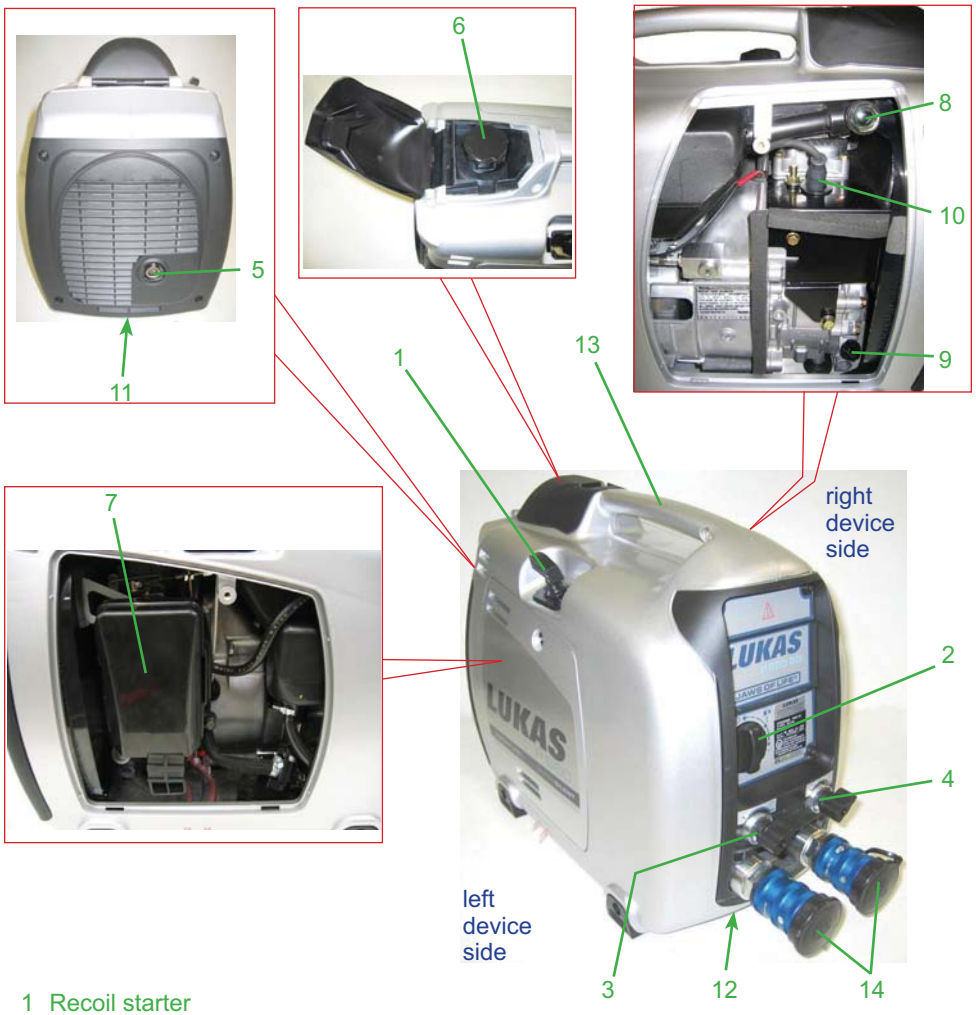
Valve variant:
S = Simultaneous operation

Motor variant:
G = Petrol-operated motor

5. Functional description

5.1 General

The main components (see image) of each LUKAS hydraulic unit are:



1 Recoil starter
2 Motor switch
3 Control switch 1 for hydraulic supply
4 Control switch 2 for hydraulic supply
5 Exhaust
6 Tank filler (fuel)
7 Air filter
8 Filler neck for hydraulic fluid
9 Motor oil filler neck with oil dipstick
10 Spark plug socket
11 Motor oil drain plug
12 Drain plug for hydraulic fluid and hydraulic fluid filter
13 Carrying handle
14 Female monocoupling

In all LUKAS hydraulic units, a motor typically operates a hydraulic pump, which delivers fluid from the tank and builds the pressure. The distribution of the fluid is then controlled by integrated valves.

5.2 Motor

These hydraulic units are equipped with a 4-cycle combustion engine, which is operated with petrol. (refer to chapter "Fuel")

5.3 Control valve

ATTENTION!
In the operation of multiple rescue devices with a unit, make sure that the usable amount of hydraulic fluid in the fluid tank is greater than the maximum possible amount of operating fluid of all connected rescue devices together!

The installed valve makes it possible to supply **two devices simultaneously** with pressure. The pressure supply of both hydraulic connections, and consequently the pressure supply of the connected rescue devices, can be controlled by way of the two control switches.

5.4 Pumps

LUKAS SUPER SILENT units are equipped with a dual flow pump.

Dual flow pump → 2 pump delivery flows

The pumps used are always equipped with two pressure circuits per pump delivery flow, a low-pressure and a high-pressure circuit.

Low-pressure circuit (ND) = up to 14 MPa*

High-pressure circuit (HD) = up to 70 MPa*

*(1 MPa = 10 bar)

The switch from low pressure to high pressure is automatic in the pump.
The maximum pressure is limited by a pressure control valve.

WARNING / CAUTION / ATTENTION!
For safety reasons, the pressure set at this valve must **not** be changed (without the direct consent of LUKAS)!

5.5 Connection to rescue devices

The connection to the rescue devices is created by extension hose pairs or hose reels. They are offered in different lengths, anti-kink colours and different connection options.
The standard hose pairs from the LUKAS line of accessories are always equipped with monocouplings on at least one end in order to connect them to LUKAS rescue devices. The individual hose lines of a hose pair can be differentiated by the different colours in order to avoid confusion of the pressure and return lines.
(For more details, please refer to the LUKAS line of accessories or contact your LUKAS dealer.)

5.6 Connection options

The connections for the hydraulic hoses are always provided on the unit.
The unit is provided exclusively with monocouplings.

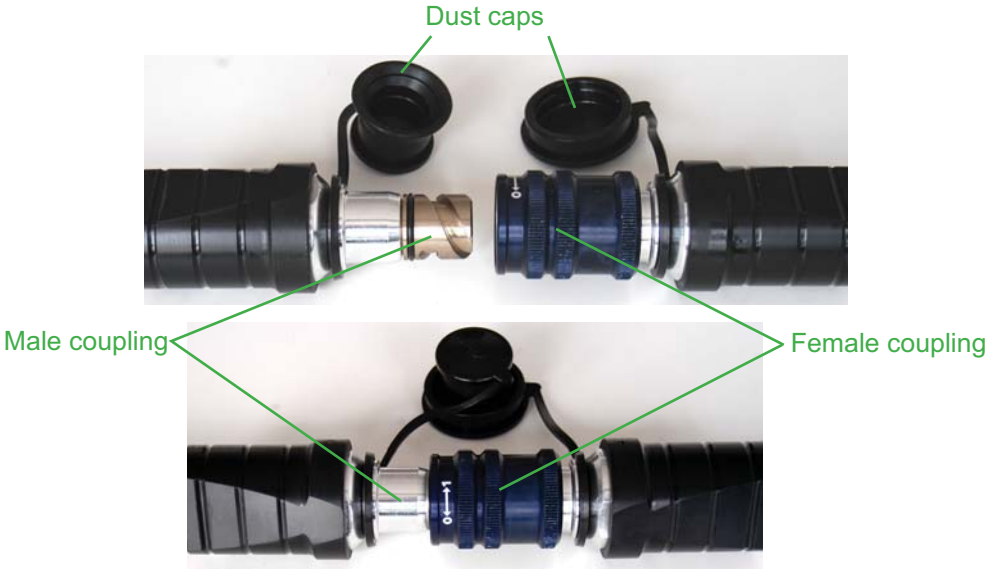
6. Connection of the hose lines

ATTENTION!
When connecting the hose lines, make sure that the connection components are not dirty and if necessary clean immediately beforehand!

ATTENTION!
Only devices in the basic position may be connected to the unit in order to avoid that an amount of hydraulic fluid greater than the maximum fill quantity can enter the tank of the unit!

WARNING / CAUTION / ATTENTION!
Before connecting devices, make sure that **all components used** are suitable for the **maximum operating pressure of the hydraulic unit**! In case of doubts, LUKAS **must** be **consulted** directly before connecting the devices!

The hydraulic hoses are connected via quick-disconnect coupling halves (female and male) to the hydraulic pump in such a way that they cannot be reversed.



Before coupling, remove dust caps, then connect male and female couplings and turn locking sleeve of the female coupling in direction "1" until the locking sleeve engages. The connection is then made and secured. The decoupling is accomplished by turning the locking sleeve in direction "0".
The coupling of the devices under pressure is also possible, assuming the connected equipment is not turned on.

NOTE:
We **recommend**, when ambient temperatures are low and extension hoses / hose reels are used, connecting the coupling halves in a **depressurised** state because decoupling may otherwise require a very large exertion of force.

For dust protection, the supplied dust caps must be reattached.

WARNING / CAUTION / ATTENTION!
The monocouplings must **not** be **unscrewed** and/or the hose lines **reversed**!

7. Installation and commissioning

7.1 Installation

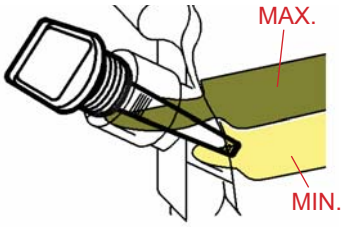
WARNING / CAUTION / ATTENTION!
Due to the possibility of spark formation, combustion engine units must not be used in areas at risk for explosion.
No units containing combustion engines may be used in closed rooms due to risk of poisoning and/or suffocation!

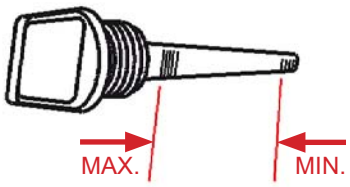
The unit should be installed at a suitable site (secure location / flat surface / sufficient distance from vehicles, loads, ignition sources, etc.).
In order to ensure maximum safety and fluid withdrawal quantities, you should operate the unit in a horizontal position to the extent possible.

7.2 Commissioning

For commissioning, you should proceed in the following way:

1. First, check the fluid levels of the unit. To do so, the unit must sit horizontally on a stable and flat surface and the motor must be switched off.
   Procedure for motor oil level:
   a) Remove the oil filler cap and check the oil level of the motor (see figure on right).
   b) If the oil level is below the lowest level, suitable oil (refer to chapter "Motor oil recommendations") must be replenished to the upper mark. When checking the oil level, do not turn the oil filler cap.
   c) Change the oil when the oil is dirty. (refer to chapter "Repairs")

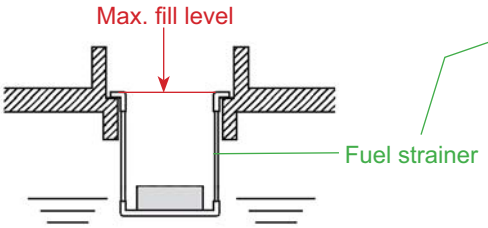


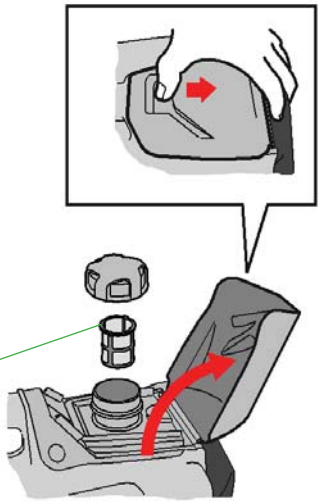


Procedure for fuel level:

WARNING / CAUTION / ATTENTION!
Never add fuel while you are smoking or in the vicinity of naked flames!

a) When the tank is empty, fill it with unleaded petrol.
b) The fuel level should never exceed the upper edge on the fuel strainer. (see figure below)
c) It is essential that the fuel strainer is used on the filler neck. (see figure on right)
d) When using the unit for the first time, or when stopping due to a lack of fuel, after replenishing fuel pull the reversing starter handle several times up to the upper edge of the fuel strainer of the fuel tank.





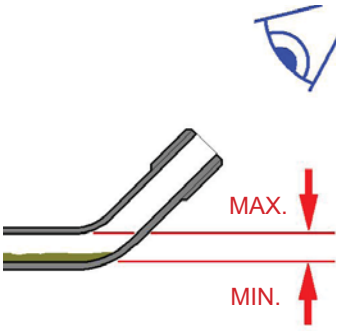
WARNING / CAUTION / ATTENTION!
To prevent fire, read all warnings!
- Do not replenish the tank with the motor running or a hot motor!
- Before adding fuel, turn the motor switch to the 0 position ("") = STOP!
- Ensure that no dust, dirt, water or other foreign matter can enter the fuel!
- Keep away from naked flames!

Procedure for hydraulic fluid level:

a) Open the fluid filler cap and check the hydraulic fluid level by looking into the filler pipe (see figure below). If the bottom of the filler pipe is just barely still covered with hydraulic fluid, the unit is at the lowest permissible hydraulic fluid level. If the hydraulic fluid is almost in the angled part of the filler pipe, the maximum permissible fill level has been reached.

WARNING / CAUTION / ATTENTION!
If more fluid is added than up to the maximum permissible level, there is a risk that the fluid can leak. If the hydraulic fluid also drips onto hot motor components, the fire hazard is extreme!

b) If the hydraulic fluid level is below the lowest level, suitable hydraulic fluid (see chapter "Hydraulic fluid recommendations") must be replenished to the maximum fill level.



2. Before starting the motor, perform the following checks:
   - Are there leaks in the fuel line?
   - Are all screws and nuts tightened?
   - Do individual components have damage or breakages?
   - Are there leaks on the hydraulic lines and screw connections?
3. Thereafter, the hydraulic unit should be bled.
   Procedure for hydraulic fluid level:
   a) Set all valve switches to "0".
   b) Set the motor switch to "0".
   c) Slowly crank the motor with the starter rope several times.
   This procedure allows slow intake of the pump and good bleeding. The hydraulic fluid tank is equipped with automatic bleeding so that no additional venting measures are required.

4. Check the hydraulic fluid level in the tank again. If necessary, you should add fluid to the fill level.

5. The unit is now operational. To use it, place it on a suitable, level site!

WARNING / CAUTION / ATTENTION!
Observe the following:
- Remove easily flammable or other hazardous material from the surroundings of the unit!
- Install the unit at least 1 m (*39.4 in.*) away from walls or other structures!
- Operate the unit only in a dry, well-ventilated area!
- Ensure than no foreign objects can enter the exhaust pipe!
- Do not bring naked flames in the vicinity of the unit! Do not smoke!
- Install the unit on a flat, stable surface!
- Do not block any air ducts of the unit with paper or other material!

6. Finally, you can connect the extension hoses and/or hose reels (as described in the chapter "Connection of the hose lines").

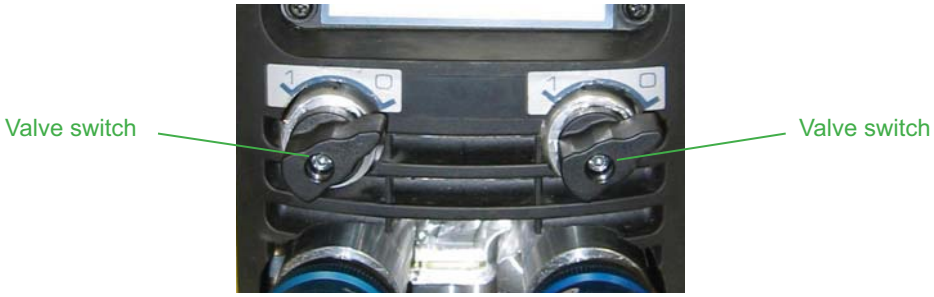
8. Operation

8.1 Starting motors

Before starting the motor, perform all instructions from the chapter "Commissioning".

Flow chart for starting:

1. Check that all maintenance openings (side parts etc.) are connected to the unit; if not, close them immediately.
2. Check that the valve switches are set to "0".



3. Set the motor switch to position "⊢" (CHOKE) (if the motor is warm, or the ambient temperature is high, start the motor with the switch in position "⛽" (RUN)).

4. Slowly pull the handle of the recoil starter until it has crossed the compression point (resistance becomes noticeable), allow it to return to the basic position and then pull it through swiftly.

5. After starting, allow the starter handle to return to the basic position, while you continue to hold it in your hand.

> ***NOTE:***
> If the motor does not start even after several attempts, repeat the procedure described above with the motor switch in position "⛽" (RUN).

6. After a warm-up phase of 20 to 30 seconds, set the motor switch to position "⛽" (RUN).

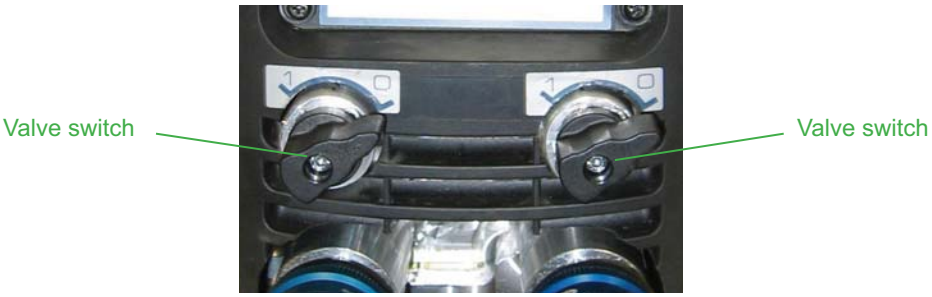
8.2 Stopping motors

The motor of the unit stops automatically when the fuel tank is empty.
If the motor should be stopped before that, the following procedure is required:

Flow chart for stopping:

1. Check that all connected rescue devices are in the original position (basic position).

2. Set the two valve switches to "0".



3. Set the motor switch to position " " (STOP).

WARNING / CAUTION!
Never touch the hot motor parts; it could cause severe burns.

8.3 Controlling the valves

Two switches are provided on the valve. Each switch is assigned to the pressure connection beneath it. By flipping the respective switch, the pressurisation of the corresponding pressure line can be controlled.

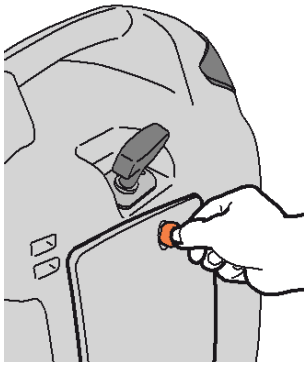
There are 2 control stages for each switch:

0 = Depressurised circulation (no pressure supply of the hydraulic line)
0 = Pressure supply of the pressure line

8.4 Opening the side parts

In order to gain access to the following parts for maintenance and repair work, take off the corresponding side cover by removing the screw with a screwdriver or a coin.

Left side cover:	air filter, fuel cock, etc.
Right side cover:	oil level gauge, ignition coil, spark plug, hydraulic fluid filling, etc.



9. Removal of the device / Shutdown after operation

After the work is completed and before shutting down the unit, you should bring all connected rescue devices into the basic position (storage position). Then you can stop the motor of the unit.

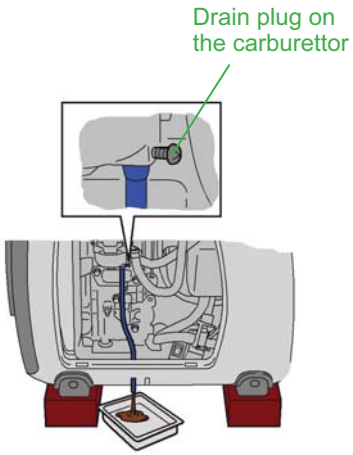
Couplings:
If the connected hose lines are supposed to be removed during shutdown, decouple the monocouplings as described in the chapter "Connection of the hose lines". Ensure that you place the dust caps again on the monocouplings.
Clean the hydraulic unit before storing it to remove dirt caused by the use.

With a longer storage time, the outside of the device should be cleaned and the mechanical moving metal parts need to be oiled. You should also drain the fuel from the tank.
Avoid storing the hydraulic units in a damp environment.

Additional measures on the motor for longer storage periods:

If the unit will not be used for a period of 6 months or more, the following measures must be taken:

- Loosen the fuel line and carefully drain the tank.
  The quality of petrol remaining in the tank deteriorates, and starting the motor becomes more difficult.
- Use a hand pump to drain the fuel from the tank and insert it in the filling port.
- Loosen the drain plug on the carburettor.
- Replace the motor oil.
- Check to ensure that no screws and nuts have become loose, if necessary retighten them.
- Pull the handle of the recoil starter until you feel resistance and leave the handle in its position.



10. Care and maintenance

The hydraulic units are subject to very high mechanical stresses. Therefore, a visual inspection needs to be made after each use, but at least once every half-year.
In this way, early signs of wear are recognizable so that damage to the device can be avoided by prompt replacement of these wear parts. Also check regularly to make sure that all attachment screws are tightened (heed any applicable tightening torque specifications).
Every 3 years, or if there is a doubt about the safety or reliability, a functional check should be also performed (For this purpose, also heed the corresponding applicable national and international specifications related to the maintenance intervals of rescue devices). In the Federal Republic of Germany, regular safety technology tests are prescribed in accordance with the regulations of the **S**tatutory **A**ccident **I**nsurance (GUV).

ATTENTION!
Clean the device before checking for dirt!

WARNING / CAUTION / ATTENTION!
To perform maintenance and repairs, personal safety equipment appropriate for the work is an absolute requirement. (incl. shields).

LUKAS offers a corresponding test set for the functional check of the hydraulic units.
(For more details, please refer to the LUKAS line of accessories or contact your LUKAS dealer.)

Visual inspection

Hydraulic unit
- are all hydraulic connections still tightened,
- generally sealed, no leaks present (oil "sweat" has no effect on the operation),
- is damage visible on the motor, hydraulic components or the housing,
- are identification plate, all control decals, instruction decals, labels and warnings present and legible,
- are all covers (e.g. exhaust cover) in place and undamaged,
- are all fluid levels within the prescribed tolerances,
- is the recoil starter in proper working condition and undamaged,
- couplings easy to connect,
- dust caps in place,
- are all required accessory parts (such as spark plug, spark plug wrench and fuel can) present.

Operational check
- no suspicious noises,
- tests at maximum load.
  (Recommendation: Use the LUKAS test set, including test instructions, for the functional check).

Additional maintenance measures on the motor:

*Every **50 operating hours** you must perform the following maintenance measures:*
- Wash the air filter element. More frequently when used in dirty or dust surroundings.
- Check the spark plug and clean it, if necessary.

*Every **100 operating hours** you must perform the following maintenance measures:*
- Change the motor oil. More frequently when used in dirty or dust surroundings.

*Every **200 operating hours** you must perform the following maintenance measures:*
- Set the spark plug gap.
- Clean the fuel filter.

*Every **500 operating hours** you must perform the following maintenance measures:*
- Replace the spark plug and filter element.
- Clean and/or adjust the carburettor, tappet clearance, valve seat and cylinder head.

*Every **1,000 operating hours** or **every 2 years** you must perform the following maintenance measures:*
- Check the starter.
- Replace the rubber assembly block of the motor.
- Inspect the motor.
- Replace the fuel line.

NOTE:
The first motor oil change must be carried out after 20 working hours. Subsequent oil changes each are due after 100 hours.

11. Repairs

11.1 General

Service work may only be performed by the device manufacturer or by personnel trained by the device manufacturer and authorized LUKAS dealers.
For all components, only original LUKAS replacement parts may be supplied in exchange, as are listed in the spare parts list, because in this way also any required special tools, assembly instructions, safety aspects, tests absolutely must be taken into consideration (see also the chapter "Care and maintenance" for more information).
During the assembly work, pay particular attention to the cleanliness of all components because dirt can damage the rescue equipment!

WARNING / CAUTION / ATTENTION!
Wear protective clothing when making repairs because the devices may be under pressure even in the idle state.

NOTE:
Always send the warranty tab back to LUKAS hydraulics GmbH. Only in this way will you have a claim to the extended warranty coverage.

ATTENTION!
Because LUKAS hydraulic units are designed for the highest performance, only components may be replaced that are listed in the spare parts lists of the corresponding unit.
Additional components of the units may only be replaced if:
- You have participated in a corresponding LUKAS service training course.
- You have the express permission of LUKAS customer service (by request, check on the grant of permission. A check is necessary in each individual case!).

NOTE:
Do not perform any repairs without the corresponding LUKAS spare parts list, because necessary tightening torques for screw connections and/or in some cases also important additional information are listed there.

ATTENTION!
Ensure that no fuel can escape during the repair work on the units!

11.2 Preventative service

11.2.1 Care instructions

The exterior of the device needs to be cleaned from time to time and the metallic surfaces need to be rubbed with oil to protect against corrosion.

11.2.2 Function and stress test

If there are doubts about safety or reliability, a function and stress test needs to be performed. LUKAS offers the appropriate test equipment.

11.2.3 Replacing the hydraulic fluid

- Replace the hydraulic fluid after approximately 200 uses, however at the latest after three years.
- Whenever possible, the replacement of the fluid should be carried out when the unit is at the operating state temperature.
- The motor must be switched off!
- The replaced hydraulic fluid must be disposed of properly.

Procedure:

1. Place the collection pan under the drain plug for the hydraulic fluid of the unit.
2. Loosen the tank filler cap and drain plug "A" of the unit and fill fluid in the provided collection pan. To do so, the hydraulic unit may also be slightly tilted.

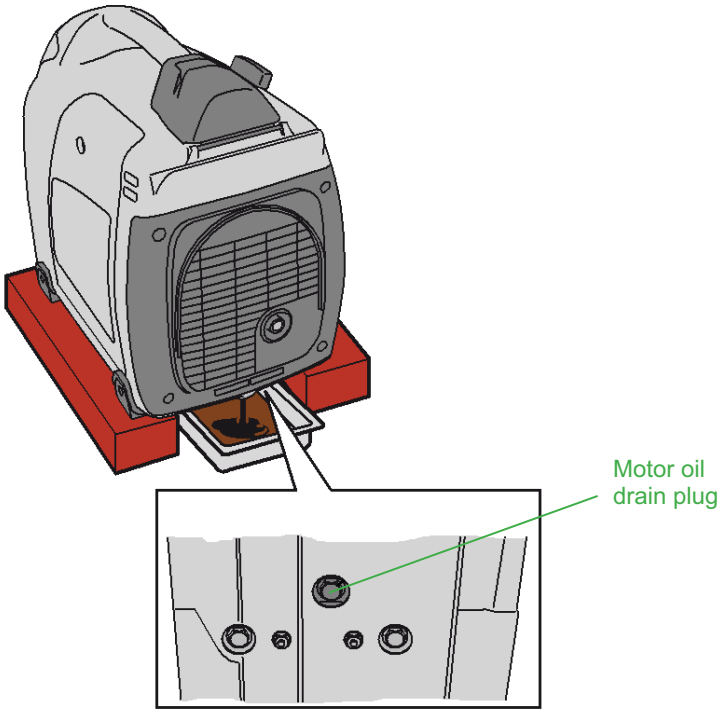
3. Remove the hydraulic fluid filter "B" and O-ring "C" located beneath and clean or replace it, if necessary.
4. Install everything again in reverse order. (If damaged, replace the drain plug with the sealing ring.)
   The tightening torque of the drain plug is M_A = 40 Nm.
5. Fill the new hydraulic fluid into the tank through the refill tap.
6. Finally, the unit must be bled again, as described in the chapter "Commissioning".

11.2.4 Replacing the motor oil

- Replace the motor oil after approximately 100 operating hours.
- Whenever possible, the replacement of the fluid should be carried out when the unit is at the operating state temperature.
- The motor must be switched off!
- The replaced motor oil must be disposed of properly.

Procedure:

1. Place the collection pan under the drain plug for the motor oil of the unit.
2. Loosen the oil filler cap and oil drain plug of the unit and fill fluid in the provided collection pan.
3. Then install them again. (If damaged, replace the oil drain plug.)
4. Fill the new motor oil into the motor up to the upper level on the oil cap.

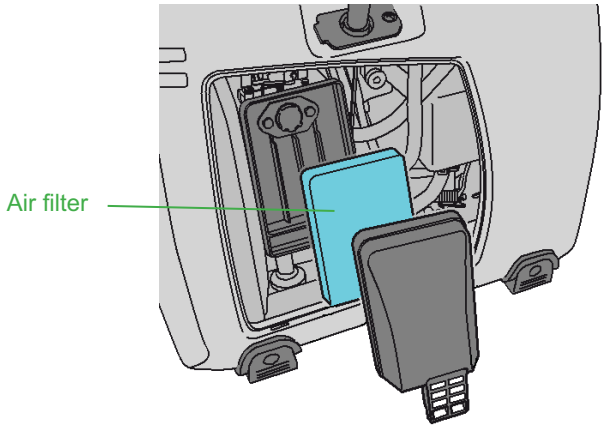


11.2.5 Replacing and cleaning the air filter

It is very important to maintain the air filter in a good state.
Dirt penetrating due to incorrect installation, incorrect maintenance, or unsuitable filter inserts leads to damage and wear on the motor. Always keep the air filter insert clean.

Procedure:

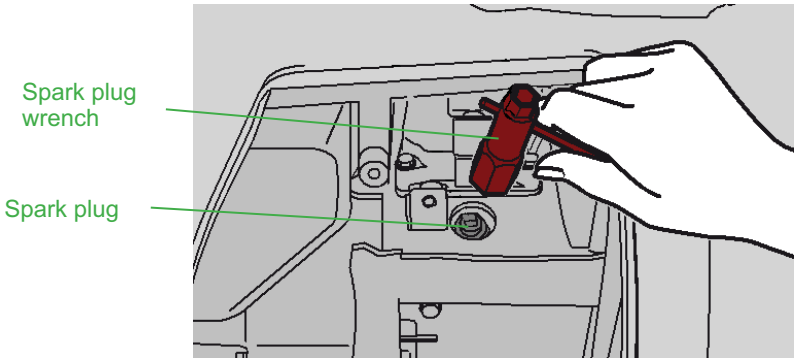
1. Unhook the cover and remove the filter insert.
2. *Paper insert:*
   In order to clean it, carefully tap it to loosen any dirt and then blow off the dust. Never use oil! Clean the paper insert every 50 operating hours and replace it every 200 hours or once a year.
3. *Urethane foam:*
   Wash out the insert with fresh water. Squeeze out the water and dry the insert. (DO NOT TWIST!!!)
4. Then reinstall the spark plug.



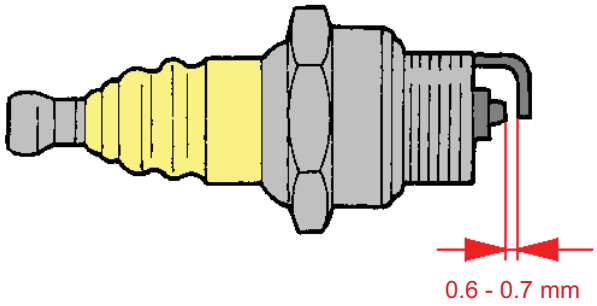
11.2.6 Replacing and cleaning the spark plug and setting the spark plug gap

Procedure:

1. Remove the spark plug from the engine using a suitable spark plug wrench.



2. If the spark plug is covered with soot, you must remove the soot with a spark plug cleaner or a brush. If the spark plug is irreparably damaged (e.g. due to melt-off of the electrodes), it must be replaced by a new one.
3. Set the gap between the electrodes to 0.6 to 0.7 mm.



4. Then reinstall the spark plug.

11.3 Repairs

To perform the allowed repairs, observe the corresponding spare parts lists with the remarks and drawings illustrated thereon.
Should ambiguities persist with respect to the repair, please consult your authorized LUKAS dealer or LUKAS customer service.

11.3.1 Monocouplings

The monocouplings must be replaced if:
- exterior damage is present,
- lock does not function,
- in the coupled and/or decoupled state, hydraulic fluid continuously escapes.

WARNING / CAUTION / ATTENTION!
Couplings should not be repaired; they should be replaced with original LUKAS parts!

Procedure:

1. Unscrew the coupling from the valve block.
2. Screw new coupling into the valve block with a torque of M_A = 40 Nm.

11.3.2 Changing decals

All damaged and/or illegible decals (safety instructions, name plates, etc.) must be replaced.

Procedure:

1. Remove damaged and/or illegible decals.
2. Clean surfaces with acetone or industrial alcohol.
3. Adhere new decals.

Make sure to adhere the decals in the correct positions. If this is no longer known, you should consult your authorized LUKAS dealer or contact LUKAS directly.

12. Troubleshooting

Problem	Cause	Remedy
Motor does not start	Fuel tank empty	Add fuel
	Lever not set to choke	Set lever to choke
	Spark plug socket not attached correctly	Press the spark plug socket firmly onto the spark plug
	Spark plug dirty	Clean the electrodes of the spark plug
	Spark plug defective	Replace the spark plug.
	Combustion engine defective	Repair by authorised dealers, engine manufacturer or by LUKAS directly
	Ambient temperature too low	Use other, more suitable unit
Motor runs, but connected rescue device does not move when the valve is actuated	Hose line not properly connected or damaged	Check connection of the hose line and reconnect it if necessary
	Valve not switched to pressurisation of the supply line	Switch valve to pressurisation of the supply line
	Valve defective	Repair by authorised dealers or by LUKAS directly
	Pump unit defective	Repair by authorised dealers or by LUKAS directly
	Female monocoupling defective	Replace female monocoupling
Connected rescue device moves slowly or inconsistently when the valve is actuated	Air in the hydraulic system	Bleed hydraulic system
	Valve defective	Repair by authorised dealers or by LUKAS directly
	Pump unit defective	Repair by authorised dealers or by LUKAS directly
Motor runs, but connected rescue device does not move, or only very slowly, when the valve is actuated	Valve defective	Repair by authorised dealers or by LUKAS directly
	Pump unit defective	Repair by authorised dealers or by LUKAS directly
	Female monocoupling defective	Replace female monocoupling

Problem	Cause	Remedy
Connected rescue device not reaching its limit position	Fluid level in the hydraulic tank too low	Add hydraulic fluid up to max. fill level
		Attention: move the rescue device back into the basic position before adding fluid!
	Usable hydraulic fluid quantity of the unit is insufficient	Use a different rescue device with a usable quantity below the maximum usable quantity of the unit
Connected rescue device does not achieve its power-related performance data	Max. permissible operating pressure of the pump is not reached	Have pressure control valve recalibrated or replaced by an authorised dealer or directly by LUKAS
Fluid leaks on the hydraulic fluid tank (especially at the refill tap)	Due to return flow of the hydraulic fluid from the rescue device, the maximum fill quantity of the tank is exceeded	Lower the fill level in the hydraulic fluid tank to the maximum
	Seals defective	Repair by authorised dealers or by LUKAS directly
Hydraulic fluid with milky cloudiness	Water or condensation water in the system	Perform hydraulic fluid change immediately
Hose lines cannot be coupled	They are under excessive pressure (e.g. due to excessive ambient temperature)	Depressurise valve
	Coupling defective	Coupling should be replaced immediately
Hose lines frequently cannot be coupled	Hydraulic fluid of the application situation not adapted	Hydraulic fluid needs to be changed (see the chapter “Hydraulic fluid recommendation” for more information)
	Coupling defective	Coupling should be replaced immediately
Leakage at the couplings	Coupling defective	Coupling should be replaced immediately

If the defects cannot be remedied, notify an authorized LUKAS dealer or contact LUKAS Customer Service directly!
The address of LUKAS customer service is:

LUKAS Hydraulik GmbH

Weinstraße 39, D-91058 Erlangen
Postfach 2560, D-91013 Erlangen

Phone: (+49) 09131 / 698 - 348
Fax.: (+49) 09131 / 698 - 353

13. Technical data

Because all values are subject to tolerances, there cannot be any differences between the data of your device and the data of the following tables!

13.1 Unit

Device type		P 660 SG
Ref.no.		175325000
Dimensions l x w x h	[mm] *[in.]*	585 x 300 x 450 *23.03 x 11.81 x 17.72*
Motor type		4-stroke gasoline engine
Motor power	[kW] *[HP]*	2,1 *2.82*
Rotational speed	[min^{-1}] *[rpm.]*	4000
max. operating pressure *(HP)*[1)]	[MPa][3)] *[psi.]*	70 *10,153*
max. operating pressure *(LP)*[2)]	[MPa][3)] *[psi.]*	14 *2,031*
Flow rate *(HP)*[1)]	[l/min] *[gal.-US/min]*	1 x 0,5 *1 x 0.13*
Flow rate *(LP)*[2)]	[l/min] *[gal.-US/min]*	1 x 2,5 *1 x 0.66*
max. fill quantity	[l] *[gal.-US]*	3 *0.79*
max. usable quantity	[l] *[gal.-US]*	2,4 *0.63*
Weight *(incl. all max. fluid fill levels)*	[kg] *[lbs.]*	30 *66.1*
Ambient temperature	[°C] *[°F]*	- 20 … + 55 *- 4 … + 131*
Valve variant		Simultaneous operation
Max. connection options of devices		2
Connection system		Monocoupling

[1)] HP = high pressure [2)] LP = low pressure [3)] 1MPa = 10 bar

13.2 Noise emissions

Device type		P 660 SG
Ref.no.		175325000
idle running (measuring distance: 1m)	[dB(A)]	77
full load (measuring distance: 1m)	[dB(A)]	79
idle running (measuring distance: 5m)	[dB(A)]	69
full load (measuring distance: 5m)	[dB(A)]	73

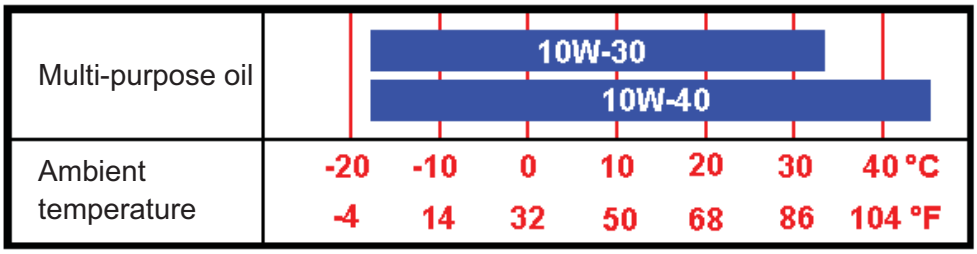
13.3 Spark plug

Spark plug type: BMR4A (NGK)

13.4 Fuel

Fuel: unleaded regular

13.5 Motor oil



13.6 Hydraulic fluid recommendation

Mineral oil DIN ISO 6743-4 for LUKAS hydraulic equipment and others

	Oil temperature range	Oil code	Viscosity rating	Remarks
A	-20 .... +55°C	HM 10	VG 10	

	Oil temperature range	Oil code	Viscosity rating	Remarks
A	*-4.0 .... +131°F*	HM 10	VG 10	

recommended viscosity range: 10...200 mm²/s *(10…200 cSt.)*

Supplied with HM 10 DIN ISO 6743-4.

ATTENTION!
It is absolutely necessary to contact your authorized LUKAS dealer or contact LUKAS directly before using hydraulic fluids made by other manufacturers.

13.7 Operating and storage temperature ranges

Operating temperature		[°C]	-20	…	+55
Ambient temperature	(device in operation)	[°C]	-25	…	+45
Storage temperature	(device not in operation)	[°C]	-30	…	+60

Operating temperature		*[°F]*	*-4*	*…*	*+131*
Ambient temperature	(device in operation)	*[°F]*	*-13*	*…*	*+113*
Storage temperature	(device not in operation)	*[°F]*	*-22*	*…*	*+140*

14. Notes

WARNING / CAUTION / ATTENTION!

Before connecting devices, make sure that **all components used** are suitable for the **maximum operating pressure of the hydraulic unit**! In case of doubts, LUKAS **must** be **consulted** directly before connecting the devices!

Please properly dispose of all packing materials and removed parts.

LUKAS Hydraulik GmbH

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MADE IN GERMANY

Subject to modifications